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## Abstract

*Conflict*  
Network Centric Warfare: Operational Application In the Land Dimension of Warfare,  
By John A. Sanders, USA, 42 pages

The military application of the network centric concept is framed by Network Centric Warfare (NCW) which is an emerging operational concept based on the stated vision of future warfare in *Joint Vision 2020*. In the Information Age, does Network Centric Warfare concept provide a more effective means of achieving strategic ends in the land dimension of conflict than distributed maneuver? Based on the post cold war environment of global complexity, limited war, and technological advancement, NCW may be a better means of applying military force in the land dimension of conflict.

In the agrarian age, classical warfare was executed in its highest form by Napoleon's pursuit of decisive battle. In this age, with detailed logistical planning and the evolution of the army corps, Napoleon moved to fight against his adversary. His unique method of preparation with archivist, the *directed telescope*, and the *Officiers d'ordonance* allowed him to out think his opponent in time and space as evidenced by his victory at Jena Auerstadt 14 October 1806.

In the industrial age, Lieutenant General Grant, conducted a premature version of operational art in the Vicksburg campaign. The development of industrial age technology such as the railroad, telegraph, and steamship allowed Grant the freedom to fight to move. By fighting to move on land and seas, Grant was able to out maneuver and out think the confederate forces in Vicksburg in May 1863.

In the information age, information technology allows commercial companies to leverage a competitive advantage over other companies by making better decisions faster. The efficiency of commercial companies increases because networked systems provide faster access to more information through the technological advancements of information technology. The issue for military forces operating in the land dimension is the ability to leverage this advantage to gain effectiveness instead of efficiency.

The first criterion, strategic flexibility, was defined as the ability to respond in time and space with the appropriate level of military force necessary to defeat an adversary in support of national aims/interests. The second criterion, operational effectiveness, was defined, as the ability to consistently provide the military capability to systematically impose the national will of the US in support of strategic objectives. The third criterion, perception management, was defined as the ability to maintain political and popular support in support of the application of military force.

NCW appears to be the conceptual means of waging war in the information age. Once operational, NCW has the potential to provide kinetic and non-kinetic means in which to apply military force in the land dimension. Although NCW is technology based, NCW's ability to integrate the human interaction needed to solidify the connectivity of systems in the land dimension needs research, discussion and examination before practical utility can be employed. NCW is a means for applying military force in the information age but cognitive agility will always be needed to make it militarily effective instead of commercially efficient.

# **Network Centric Warfare: Operational Application In The Land Dimension of Conflict**

**Major John A. Sanders**

**A Monograph**

**by**

**United States Army**



**School of Advanced Military Studies  
United States Army Command and General Staff College  
Fort Leavenworth, Kansas**

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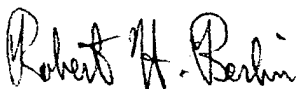
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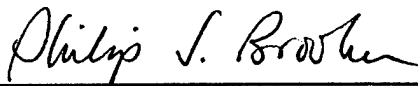
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# **Chapter 1**

## **Introduction**

### **Definition/Background/Significance/Methodology**

The post cold war operational and strategic environments pose unique challenges to the application of military force in the land dimension of warfare. Consideration of asymmetric threats, urban environmental elements, and the proliferation of the media have added to the complexification of the operational and strategic environment. These changes impact the application of military force in support of national objectives. With the advent of information technology, individual users are equipped to transform large amounts of data and change it into applied knowledge. Essentially, the proliferation of information technology allows individual users the ability to process, synthesize, and apply information faster than ever before. This ability directly impacts the conduct of future conflict in the land dimension of warfare. A new concept introduced in 1995 by the Joint Chief of Staff's Joint Vision 2010 is Network Centric Warfare (NCW). Conceptually speaking, NCW allows military forces operating in the land dimension to apply information technology to gain a competitive advantage over the adversary.

The network centric concept is a derivative of network centric computing.<sup>1</sup> Essentially, it is a systems approach to network computing. The evolution of computing from platform centric computing to network-centric computing has been largely enabled by recent key developments in information technology.<sup>2</sup> These recent developments have increased a computers' power while decreasing their size and the time they need to process information. Their enhanced abilities to process, synthesize, and apply information have already allowed

commercial companies to leverage these innovations by speeding production, while reducing overhead, and cost.

The military application of the network centric concept framed by Network Centric Warfare (NCW) is an emerging operational concept based on the stated vision of future warfare in *Joint Vision 2010*. Dominant maneuver, precision engagement, focused logistics, and full dimension protection, along with the enabling capability of information superiority, give U.S. forces the ability to conduct full spectrum operations in the 21<sup>st</sup> century.<sup>3</sup> NCW is an enabling function to each, using information technology. While NCW is currently conceptual, there are operational models, which employ the NCW concept to leverage the impact of information technology.

Network Centric Warfare is essentially knowledge-based warfare through the use of network systems. These networked systems are broken down to three areas. The three areas or grids, which comprise NCW, are: the information grid, the shooter grid, and the decision maker grid.<sup>4</sup>

The information grid encompasses all of those systems which facilitate the acquisition, processing, and dissemination of relevant information to decision makers. The shooter grid includes all those systems, which receive targetable data and engage targets to accomplish the military objective. The decision maker grid represents the area in which commanders at multiple levels position themselves to receive information and decide to act upon based upon situational awareness and common understanding of the terrain, enemy, and friendly forces.

Commercial companies leverage a competitive advantage over their market adversaries by employing information-based strategies, which use these network centric ideas. These information-based strategies are enabled by the utilization and application of computer



assisted technological capabilities. Companies employing these information-based strategies enabled by new computer technology then begin to dominate their markets by exploiting their new information superiority.

Military implications of this new capability are numerous. Most notable is its potential to allow increased awareness and understanding of terrain, weather, enemy, and friendly forces through networked systems over space and time. This increased awareness facilitates collaborative planning, dynamic re-tasking of assets, and real time operational fusion in a contiguous or non-contiguous environment. To some degree, all military services have incorporated the increased operational capabilities derived from networked systems.

The Navy employs network centric operations by utilizing an existing operational architecture of cooperative engagement capability (CEC) at the operational level of war. This CEC has grafted new technology onto existing architecture resulting better connectivity between sensor, shooter, and decision-maker.<sup>5</sup> This network centric linkage is responsible for the reduction in the engagement response time. This concept has already been operationalized within the land dimension of conflict at the tactical level.

The Air Force has also utilized sensor to shooter links in most of its operations. A standard Suppression of Enemy Air Defense (SEAD) mission is the most prolific modern day example of the impact of network centric warfare. While methods of application for SEAD varies between the Offensive Counter Air (OCA) and Defensive Counter Air (DCA) missions the basic concept remains the same. This concept is to provide systematic suppression of enemy air defense assets in order to protect friendly air assets. The gradual application of SEAD has dramatically decreased the loss rate of those air forces that utilize its doctrines and methodologies while those Air Forces who do not use it to lose.<sup>6</sup>

Army intelligence assets have operated in a classified network centric environment for many years. These networks have provided synergy and collaboration at the strategic level in support of national level consumers. The proliferation of open source information in the information age calls for network centric environments to be unclassified and pushed down to the operational and tactical level which facilitates faster tactical and operational level decision-making.

Given its use by all forces, NCW appears to be valid concept for military forces in the future to leverage the capabilities of information superiority and gain a competitive advantage over future adversaries. Additionally, given its current validity, it may have future validity. The critical issue is to utilize the lessons learned from commercial companies who have adopted the NCW concept while understanding their emphasis on because of its efficiency vice effectiveness. This efficiency versus effectiveness model works for the competitive business sector because human life is not the currency. In this environment efficiency can afford to take a back seat to effectiveness. Military forces to counter armed aggression against US interest worldwide. For NCW to have a significant impact on the land dimension of war, it must demonstrate the practical utility of maximizing effectiveness versus efficiency. NCW appears demonstrates effectiveness in the land dimension of conflict by consistently providing operational and tactical soldiers, through information technology, the ability to not only know more faster concerning the weather, terrain, enemy, and friendly soldiers but to apply this knowledge faster than the enemy in time and space.

The land dimension of warfare is changing rapidly. The ends, ways, and means of waging war have evolved from the classical nature of decisive battle to the selective nature of utilizing kinetic and non-kinetic methods of waging information warfare in a constrained post

cold war strategic environment. The most significant are changes to the means. The means are defined as the direct application of force to accomplish the stated goal. The technology used today, which give military forces, their fighting capabilities are changing, and these changes point toward a qualitative jump in our ability to use military force effectively.<sup>7</sup>

The battlefield is no longer contiguous but non contiguous. Engagements are no longer sequential but simultaneous and sequential. US adversaries attack utilizing asymmetric means to negate the technological overmatch. Today, US technology enables soldiers to see in the dark, land navigate utilizing space-based assets, and see enemy formations near real time using a remotely controlled pilot less air craft. These significant technological changes are results of the information age.

Another significant change is found in emerging information technology. All of these capabilities are representative of the astounding technological advancements of the information age. But what do they give us in terms of war fighting capability? They allow us to see, move, and think faster than the enemy. It essentially gives a superior information advantage. In other words, the objective is to leverage this superior information advantage to create and maintain a competitive advantage in the land dimension of conflict.<sup>8</sup> In this dimension, enabled by technology the military operational and tactical observe, orient, decide, act (OODA) loop speed is compressed to leverage an operational advantage.

Even with these new technologies advantages, perfect knowledge of the enemy is not attainable. Nonetheless, if you see the terrain, see the enemy, and see yourself faster than the enemy can see you, you have achieved a comparative advantage. In essence, you have gained information superiority. Information superiority is defined as the ability to collect, process, and disseminate an uninterrupted flow of information while exploiting and/or

denying the adversary's ability to do the same.<sup>9</sup> In military operations this superior information position is, in part, gained from information operations that protect our ability to collect, process, and disseminate an uninterrupted flow of information while exploiting and/or denying an adversary's ability to do the same.<sup>10</sup>

Alvin and Heidi Toffler have published several books, which have described the nature of conflict throughout human history. In one of their books, *War and Anti War*, they postulate that conflict can be broken down into three distinct waves of change. The first wave is the agrarian wave. The second wave is the industrial wave. The third wave is the information third wave. These waves of change will provide the structure for the study of NCW in the information age.

### **First Wave**

In the Agrarian age of warfare, civilization was tied to the land dimension. In the model postulated by Alvin and Heidi Toffler in *War and Anti War*, the first wave addressed the revolution of farming societies. When the agricultural revolution launched the first great wave of change in human history, it led gradually to the formation of the earliest premodern societies.<sup>11</sup> Farming societies and civilizations are inextricably linked to the agrarian way of life. Agriculture became the womb of war for two main reasons. It enabled communities to produce and store economic surplus worth fighting over.<sup>12</sup> Warfare during this time frame was seasonal based on harvesting. Output in agrarian societies was slow and food surpluses still so small that over 90% of all manpower was needed simply to work the land.<sup>13</sup>

This first wave war period ended with the French Revolution and the Napoleonic wars.

The social context of the French Revolution and the "*levee en masse*" brought about significant changes to the French way of life. French citizens were finally empowered to

control their own destiny. With politics suddenly fluid as never before, military men could entertain political ambitions of their own as never before, either individually, or as a corporate professional body that might become a state within a state.<sup>14</sup> Out of this French social movement of empowerment, came the rise of Napoleon Bonaparte.

Based on the massive size of the French army, enabled by “*levee en masse*”, Napoleon Bonaparte was given unprecedented numbers of citizens available for military service. These raw numbers allowed Napoleon access to the material needed to implement large-scale military operations in the agrarian era. His ability mobilize, move, and mass during this period was truly revolutionary. In scope and scale, the institution of the Army Corps system and the rigorous professional military education produced a military system of measured competence in senior leaders. Thus Napoleon leveraged a militarily competitive advantage over other nations, most significantly expressed in his destruction of the Prussians at Jena/Auerstadt in 1806.

During this campaign, Napoleon’s *Grande Armee* demonstrated the operational effectiveness of his planning even when one his corps commander’s was indecisive and arrived too late in Jena too late. Indeed, this campaign was destined to remain the greatest triumph of Napoleon’s strategy of annihilation.<sup>15</sup> Jena/Aeurstadt is one of the finest examples of Napoleon’s military planning.

The operational application of classical warfare lends itself to decisive battle where forces “move to fight”. Moving to fight is the important concept for this period. The focus of Napoleonic planning was in the greatest tradition of agrarian age warfare. “The best strategy is always to be strong; first in general, then at the decisive point...There is no higher and simpler law of strategy than that of keeping one’s forces concentrated... In short the first

principle is: act with the utmost concentration.”<sup>16</sup> The ends, ways and means of prosecuting classical warfare in the agrarian age were tied to the limits of time, space, purpose, and aim.

## **Second Wave**

Lieutenant General Ulysses S. Grant exemplifies the second wave’s industrial age operational commander who practiced operational art to achieve his military objective. After Grant arrived in theatre to assume command, he was immediately hit with the sense of the decisiveness of the Vicksburg campaign.<sup>17</sup> This campaign was Grant’s defining moment as a leader and practitioner of operational art. This quotation exemplifies the context of the Vicksburg campaign, “...Grant believed that his pending campaign against Vicksburg would be decisive. Another military failure on the heels of misfortune elsewhere would pave the way for Southern independence.”<sup>18</sup> Grant’s ability to recover from Sherman’s loss at Chickasaw Bayou and fight to maneuver in and around Vicksburg ultimately allowed him with the support of admiral Porter to seize Vicksburg and effectively split the Confederacy.

Grant effectively applied the second wave technological advantages by utilizing the telegraph, railroad, and littoral ironclad ships. The telegraph allowed communications among commanders to be received and translated over greater distances in less time. The railroad allowed soldiers and equipment to be moved over greater distances in less time with reduced wear and tear. The littoral ironclad ships allowed an alternate means of transport as well as a waterborne indirect fire asset. These and other technological innovations set the stage for the internal US conflict.

In the midst of the industrial revolution, Grant leveraged a competitive advantage over the stationary Confederates by conducting distributed maneuver. The essence of the distributed

maneuver concept is enabled fighting to move. Grant fought to maneuver on land and sea both simultaneously and sequentially.

The concept of joint force employment to leverage an advantage in the land dimension of conflict during this period was significant. Operational effectiveness and strategic flexibility were demonstrated during this campaign. The ends, ways, and means of prosecuting operational art were directly tied to the time, space, purpose, and aim in the industrial age.

### **Third Wave**

The social context of the third wave is characterized by the increasing demand and requirements for information. In the age of information warfare, the operational commander of the future will be tasked to deal with complex issues in chaotic and ambiguous environments. Technology can enable the reduction of some fog and friction by increased knowledge and awareness of the battlespace.

In the commercial sector, private organizations are leading the way in adopting information age concepts to change the face of business. New technology is amazing and can be hypnotic. However, its ability to provide a competitive advantage is the true test of its practicality and utility.

Information processing is the key component. Technologies, which process, analyze, collate, and distribute information faster are foundational tools for organizations which can achieve a competitive advantage. This advantage gained then leads to organizational success. This model works well in business but given the chaos, complexity, and uncertainty in the land dimension of conflict, operational commanders must leverage information superiority consistently in a non contiguous geographic environment which is human centric. Human

interaction must be foundational to any application of NCW in the land dimension. Because open source information is so accessible, perception management becomes more important.

### **Thesis Statement**

In the Information Age, does Network Centric Warfare concept provide a more effective means of achieving strategic ends in the land dimension of conflict than distributed maneuver? The efficient commercial application of leveraging information superiority to gain a competitive advantage in the business sector has been documented. The issue is the effective military application of this concept in the land dimension warfare to gain competitive advantage over the adversary while denying the adversary the ability to exploit your vulnerability.

### **Methodology**

The agrarian, industrial, and information age ends, ways, and means have evolved based on technological and more importantly social changes. As a result of the cultural changes involved, the agrarian-based economic system triggered a corresponding revolution in making war in the first wave. Decisive battle was the effective means of applying military force in the agrarian age. Distributed maneuver was the effective means of applying military force in the industrial age. Conceptually, dominant maneuver enabled by information superiority appears to be the effective means of applying military force in the information age.

Chapter two will examine Napoleon as he operated in the agrarian age. It will examine the ends, ways, and means of applying military force in the land dimension of warfare during the agrarian age. The ends of this period are the imposition of will against the commander and troops in the field. The ways are the prosecution of classical warfare utilizing grand tactics. The means are seeking decisive battle to annihilate the enemy army by “moving to fight”.



The military systems, which enabled this method of warfare, will be examined. Lieutenant General Grant during the Vicksburg campaigns illustrates the industrial age of warfare in the land dimension. As Grant maneuvered around Vicksburg along exterior lines, he systematically gained information about the enemy while denying the enemy the ability to predict his next move. It will examine the end, ways, and means of applying military force in the land dimension of warfare during the industrial age. The ends of this period will be viewed as the imposition of will against the enemy commander, troops, and civilian population. The ways will be viewed as the prosecution of operational art utilizing sustained logistical support. The means will be viewed as practicing distributed maneuver demonstrated by "fighting to move". The military systems used to execute this strategy will be examined.

Chapter three will define the three criteria and provide the framework to measure the potential effectiveness of network centric warfare. The first criterion is strategic flexibility. Strategic flexibility is defined as the ability to respond in time and space with the appropriate level of military force necessary to defeat an adversary in support of national aims/interests. The second criterion is operational effectiveness. Operational effectiveness is defined as the ability to consistently provide the military capability to systematically impose the national will of the US in support of strategic objectives. The third criterion is perception management. Perception management is defined as the ability to maintain political and popular support in support of the application of military force.

Chapter four will measure network centric warfare against the three research criteria. The next great operational level leader will practice information art. The ends of this period will be viewed as the selective imposition of will at specific time and place with maximum effects

and minimum collateral damage to influence adversaries. The ways will be viewed as the prosecution of information art. Information art is defined as the concerted but selective application of kinetic force and information operations simultaneous and sequentially in support of a military objective. The means will be viewed as the ability to operate with distributed knowledge and distributed awareness by fighting to know and knowing when to fight.

Future military leaders in the information age will understand information operations and how to gain the competitive advantage against the threat while leveraging information superiority. This concept will not work unless careful cognitive effort is applied to incorporate the “human” factor of the land dimension. If not, NCW will be on the dazzling power point presentation with little or no practical application in reality.

In closing, the three criteria will be used to measure the utility of NCW over distributed maneuver in the Information Age. The results will show the applicability of Network Centric Warfare to the human concentrated land dimension of warfare during the information age maybe more effective than distributed maneuver. The information age’s constrained and restrictive environment calls for a quick decisive method of selectively engaging adversaries. NCW offers a systems approach of connecting military systems to gain an informational advantage over opposing forces.

## **Chapter 2**

### **Historical Analysis**

Two historical studies will be used to provide military examples of agrarian and industrial age commanders applying military force in the land dimension of combat. Napoleon's campaign in October 1806 found his units divided at Jena and Auerstadt and engaged against Frederick Williams forces retreating toward Berlin. Lieutenant General Grant's Vicksburg campaign serves as the industrial example of a commander applying military force in the land dimension. Examination of these examples will provide a foundation for the utility of network centric warfare in the land dimension.

### **1<sup>st</sup> Case Study – Napoleon - Jena-Auerstadt Campaign**

#### **Strategic Context**

The French Revolution was the principle socio-political event affecting Napoleonic warfare. "With the old feudal system swept away, the republic could exploit the state to an extent no monarch could or would dare to do." The largest single military impact was the "levee en masse".<sup>19</sup> While the armies of the French Revolution coincided with the beginnings of the Industrial Revolution, the incorporation of the people into the war effort through the *levee en masse* was more important than anything issuing from the Industrial Revolution.<sup>20</sup>

The collapse of the Bourbon regime in 1789 signified the end of the medieval class separation between the bourgeois and the proletariat. The people were finally empowered to make their own decisions regarding the future of the state. The French Revolution brought new complexities to civil military relationships.<sup>21</sup> The significance of this social change was felt in all aspects of the French way of life. France's move from small professional dynastic armies to armies of national conscription and large formations opened a new door on warfare

in which operational art became a key to victory of the battlefields of Europe. From 1792 to 1815, there would be a series of conflicts involving the major powers of Europe. France would fight against a shifting alliance of other nations, employing the armies created out of the social and economic upheaval linked to the French Revolution. These armies employed organizational, tactical, and strategic techniques developed during previous decades to fashion a force, which dominated Europe during this time period.

The *Grand Armee* of Napoleon, for instance, was part of a revolution in military affairs that was derived from the social and political upheavals of the French revolution. Napoleonic Warfare was more evolutionary than revolutionary. Napoleon practically applied military principles written by military theorist Bourcet and Guibert. Napoleon stated, "Strategy is the art of making use of time and space."<sup>22</sup> It represented a significant change in the nature and conduct of warfare in its time; one which had profound effect on the nations of Europe and Asia at that time.

"Napoleon...made use of the economic and technological backwardness of his time in order to exercise command in the field, yet...found ways to liberate strategy from the limitations traditionally imposed on it by that very backwardness."<sup>23</sup>

All of these innovations allowed Napoleon the economic, social, and environmental foundation to conduct warfare at a different level. Napoleon's staff provided him with information concerning history, geography, and any other relevant facts concerning tactics, techniques, and procedures.

There were at work...other factors that made the revolution possible. Everywhere new roads and canals were being built, which facilitated travel, and in many places made parallel roads available for the first time. A regular network of royal mail services...now linked all the main cities...Cartography...had made great strides...maps of all sizes and quantities were now...available...population density had increased to the point where

many regions could support armies...the technological-economic foundation for a revolution in strategy was clearly being laid.<sup>24</sup>

The battle of Jena-Auerstadt will be used to demonstrate Napoleon's method in executing his agrarian based classical warfare. The model for this historical analysis will be categorized into the ends, ways, and means.

Armed with the logistical reserve of men, equipment, and supplies, Napoleon set out to wage war with the opponents of France and further its territorial holdings. Napoleon's method of providing guidance concerning the strategic aim was to craft a grand strategy, which focused on the destruction of the adversary's army. The strategic end to a Napoleonic campaign was the surrender of the enemy by way of defeating the field army.

Unlike the Allies, Napoleon had a unifying operational theme to his plan of a campaign: to keep his enemies divided and decisively destroy them in the critical theater of operations...Napoleon saw the conduct of war on the European continent holistically rather than in segments...[he] had what was later referred to as operational vision.<sup>25</sup>

In October 1806, at Jena-Auerstadt, Napoleon's objective was to position himself between the Prussian Army and Berlin and force Frederick William to fight a defensive battle on his own territory.<sup>26</sup> Once the Prussians realized their position they began to retreat but not fast enough. The Prussian left a rear guard of about 38,000 troops at Jena and the remainder of the Army marched north toward Auerstadt, a village on the route to Berlin.<sup>27</sup> As Napoleon decimated the Prussian rear guard with four corps of 96,000 troops at Jena, Davout's 27,000 troops met Frederick William's 63,000-man main force.<sup>28</sup> Davout was able to establish an effective artillery crossfire pattern that succeeded in shaking the Prussian advance.<sup>29</sup>

This victory was decisive because it facilitated the occupation of Berlin and solidified the Emperor's hold on all of Europe. Napoleon would then be in a position to shatter the Russo-Prussian alliance.

### **Agrarian Ends**

The agrarian ends during the battle of Jena-Auerstadt focused on the destruction the Prussian military forces commanded by Frederick William. This victory would served to isolate the German capital city of Berlin, consolidate Napoleon's power in Europe, and facilitate the breakup of the Russo-Prussian alliance. Thus, by the end of 1806 it appeared as though Napoleon had but to defeat the Russians to consolidate his dominant position in central Europe.<sup>30</sup>

“Once a state of hostilities existed between France and another power...[he] set out without delay or hesitation to destroy the enemy's field forces by all available means and thus break the national will to resist...the means to the end were to be the shortest and sharpest methods available...the central theme of Napoleon's concept of warfare: the blitzkrieg attack aimed at the main repository of the enemy's military power—his army.”<sup>31</sup>

### **Agrarian Ways**

Specifically, Napoleonic Warfare was revolutionary because it embodied a fundamental shift in the paradigm used to apply military capabilities to achieve success on the battlefield. It represented a significant change in the nature and conduct of warfare in its time, one that had profound effect on the nations of Europe at that time. Once Napoleon was aware of the Russo-Prussian alliance, he chose to not make serious concessions concerning territorial boundaries in Europe in order to provide diplomatic isolation. Concluding that Prussia's independence and great power status were in danger of being eclipsed, Frederick William decided to fight. Napoleon then chose to destroy the Prussian forces commanded by Frederick William by swiftly mounting a military campaign, which would culminate in a

decisive battle. This decisive battle was conducted before the Russian forces were able to reinforce the Prussian Army.

### **Agrarian Means**

The means by which Napoleon executed the plan at Jena-Auerstadt was the operational maneuver of his five army corps to leverage a geographic and force oriented advantage over the Prussians. This victory was in jeopardy had Davout not competently defended Auerstadt against Frederick William's numerically superior force. Bernadotte was unable to move north to Auerstadt fast enough to reinforce Davout as directed by Napoleon. The battle at Auerstadt was the decisive battle.

The operational dynamic of moving to fight characterized the means by which Napoleon defeated most of the European powers of his time. The difference between operational campaign and classical strategy is that in the latter, victory was normally the product of a single battle whereas in the former, a series of battles were required to attain strategy. The table below outlines some of the key components of Napoleonic warfare are as follows:

- Maneuver and battle warfare
- Distributed maneuver
- Dispersed corps and divisions
- Campaign maneuver & battle interrelated
- Grand Tactics and Tactics
- Levy en masse/mobilized economy
- Rank/position based on merit/ability
- Leadership by courage/example
- Artillery standardized
- Complex command/control system
- Army-corps-division-brigade
- Large size/scale of warfare
- Strategic-operational-tactical levels of war

Of these changes, the most significant contribution in the way of organizational means was the development of the corps structure, the directed telescope, and the general staff. The

corps system of organization was a key component. Napoleon was not the first military leader to attempt to improve military organizational structure.

At the same time...the first attempts to improve the organization of armies were being made. Already in the middle of the eighteenth century Saxe had dreamt of permanently organized legions capable of carrying out independent operations. Bourcet...organized an invasion along several parallel axes...and later helped de Broglie...to make the first attempt at organizing an army into divisions of all arms. Experiments along these lines continued, leading to the creation of the first corps...in 1794. What the campaign of 1805 revealed...was a direct outgrowth of these experiments and yet, completely new and unprecedented: an army 150,000 strong organized into eight numbered corps, each containing units of all arms and each provided with a uniformly structured...staff to direct its operations—each a little army in its own right.<sup>32</sup>

To guard against his orders becoming distorted as they made their way down the chain of command and to keep subordinates on their toes, Napoleon employed a “*directed telescope*” to bring information to himself on any part of the enemy’s forces, the terrain, or his own forces. Such information was tailored to his specific needs. There were two groups who assisted Napoleon with visualizing the complexity: First, Napoleon used eight to twelve men, between thirty – forty years old; usually BG to MG in rank. Their duties were to reconnoiter entire countries, negotiating surrender, spying on enemy HQs, governing a province, or commanding a garrison. Their duties called for savoir faire and diplomacy, and physical stamina. Second, Napoleon used Officers d’ordonance. They were twelve men, under twenty-four years of age, LTs and CPTs. Their duties were transmission of messages; gather topographical information on bridges, roads, fortresses, etc. This job called for physical stamina because they were called “Mission impossible” men. Marshall Berthier was the model director for a General Staff. He was responsible for the following duties:

- (1) Handle (copy, register, send) Emperor’s correspondence inside army
- (2) Expand and elaborate Napoleon’s order
- (3) Supply Napoleon’s cabinet with information on the army



- (4) Work out enormous details of routine operations: orders of the day, postal services, passwords, police, gendarmerie, supply columns, hospitals, POWs, deserters, recruits, courts martial, civil government<sup>33</sup>

The combination of the corps system, the directed telescope, and an efficient general staff enabled Napoleon to revolutionize the conduct of land warfare in the agrarian age.

### **Analysis**

Napoleonic warfare's characteristic of moving to fight enabled by key organizational and social changes personified the epitome of decisive battle. Napoleon's *Grand Armee* demonstrated the ability to be operationally effective during the agrarian age by developing a strategy to coordinate the movement of military forces through time and space at the appropriate point for the purpose of conducting decisive battle. The Grand Armee was operationally responsive but not strategically flexible. Movement of the Army was tied to the roads and predicated on the physical conditioning of the soldiers. But the *Grand Armee* moved faster than the enemy. Moving faster than the enemy in geographic terms meant moving to fight. Moving to fight allowed French forces to mass and dispersed faster than the enemy. This form of warfare was institutionalized and reinforced in the French professional military. Napoleon's command of the battle at Jena is interesting in that it marks the end of an epoch in which it was possible for a commander in chief to overlook a field and take a direct part in the conduct of the engagement.<sup>34</sup>

Napoleon's genius lies in his ability to synthesize data and out think his opponent. Napoleon developed a military strategy to accomplish his objectives. He developed a way to unify his efforts. He conducted mental intelligence preparation of the battlefield to gain a deeper understanding than his adversary of the terrain, weather, and opposing forces.

The systems of military education, military training, and military organization developed as a result of the French Revolution also contributed to the overall success of the French Army. A byproduct of the system was outstanding leaders who grew up in a system of high professional standards and expectations. It was the caliber of the truly natural leaders who emerged from the ranks of the Revolutionary Armies to command battalions, demi-brigades, divisions, corps and armies that made Napoleon's achievements possible. He himself was, of course, the greatest product of this aspect of the Revolution."<sup>35</sup>

## **2<sup>nd</sup> Case Study: Grant at Vicksburg Campaign**

### **Strategic Context**

The Newtonian/Cartesian Revolution ushered in an age of industrial revolution. Newtonian mathematics provided the foundation for terrestrial and celestial mechanics which crowned the development of the mechanical worldview that dominated thought until the 20<sup>th</sup> century and laid the foundations of modern physics.<sup>36</sup> This served as the technological backdrop for industrial innovations used to alter the speed and magnitude of land warfare. The leader in this new era of fighting would have to orchestrate these innovations into usable operational measure, which would provide military effectiveness.

For Grant, the Vicksburg campaign was a test of his proficiency as a military leader. President Lincoln and Secretary of War Stanton were on the verge of firing Grant based on his past performances and on reports of a drinking problem. A former journalist, Charles Dana was hired by the Secretary of War to evaluate Grant's leadership ability and came down from Tennessee to observe Grant's operational leadership through the Vicksburg campaign. Union General officers spoke openly about Grant's past military shortcomings. "This campaign is being badly managed. I am sure of it. I fear a calamity before Vicksburg. All

Grant's schemes have failed. He knows that he has got to do something or off goes his head."<sup>37</sup>

As Napoleon invented strategy, Grant "invented" operational art as it is currently understood.<sup>38</sup> Operational art is the employment of military forces to attain strategic goals through the design, organization and execution of campaigns and major operations.<sup>39</sup> The Vicksburg campaign served as the laboratory for the practice of operational art. Grant, after the Chickasaw Bayou fight, continued his military operations on land and water by fighting to move. The movement of his soldiers was coordinated effort and his subordinate commander's were equal to the task.

His relationship with Admiral Porter and most of his subordinate commanders allowed him freedom of maneuver on land and sea. Porter respected Grant's ability to lead land forces but was not in agreement with all of Grant's operational decisions. General Sherman and General McClelland remained at odds with one another because of Sherman's loyalty to Grant and McClelland's special relationship to President Lincoln.

The technological advancements of the industrial age, primarily the telegraph, steamship and the railroad, enabled Grant to operate with maximum impunity throughout the Vicksburg campaign. The telegraph provides extended communications at a faster rate of speed. The railroad became the 'bones' of operational art.<sup>40</sup> The American Civil War was the first war in which rail transportation played a major part, and by the fixed form of its own routes it naturally tended to make strategy run on straight and straightforward lines.<sup>41</sup> The steamships of Admiral Porter were instrumental in providing a sea-lane of passage for troops and equipment. This capability enabled Grant to bypass Vicksburg, land troops, and maneuver north to isolate the city from being enforced by confederate soldiers from the east. Several

factors shaped the environment of the Vicksburg campaign. The most notable was the impact of the Mississippi river and the surrounding terrain.

Terrain played a significant role in the Vicksburg Campaign. Rivers were the highways of Federal military power.<sup>42</sup> The Mississippi river flood planes impacted the operational maneuverability of Grants forces. The consistency of the loess soil was soft and its impermeability means that there is a lack of soil storage of water.<sup>43</sup> Although new technological innovations were changing aspects of warfare, geography and the military aspects of terrain were always relevant to tactical commanders operating in the land dimension of conflict.

### **Industrial Ends**

In the industrial age, technological innovations facilitated large troop movements over longer distances and with greater dispersion. The overall strategic objectives of the Vicksburg campaign were: secure an outlet for Midwest agriculture, co-opt political support in old northwest, interdict movement of southern resources, and split the confederacy. The economic impact of not having the slave trade to support the agrarian based culture of the south was the driving force behind the confederate break from the republic.

The North started the war with Winfield Scott's "Anaconda" strategy of choking the south to death. This was suggested because it was believed that this would create less pain than an all out assault into the south. After this strategy failed came the "on to Richmond" strategy. This entailed the belief that if Richmond was captured the war would end. Lastly, they went to Grant's strategy of total war and linking operations that were separated by space & time to defeat the south.<sup>44</sup> The south had the question of just staying on the strategic defense with tactical offense (what they started with) or a purely offensive strategy (what they ended up

doing later) of going north to deal the Union Army a decisive blow. The following factors were some that contributed to the outcome of the war: economic strength of the north, greater available manpower in the north, inability of south to conduct effective diplomacy with foreign powers, interior lines of the south, better political unity in the north, lack of unity in the south for the prime goal and the effect of states rights in the south.<sup>45</sup> The telegraph, steam locomotives, and the rifled bullet were all technological factors in the war. The South, despite having a tough nut to crack, had a chance to win but failed to look at the war as a complex system and did not appear to do a true mission analysis. Because they relied on Lee for their strategy they were bound to his mental models instead of having the benefit of more intellectual discussions of strategy.

The strategy pursued by the Confederacy was to take advantage of interior lines and mobility of rail and river. This is largely a Jominian concept of massing at a point of enemy weakness enabled by effective operational mobility. The nature of secession forced the North to be the invader permitting the south to take advantage of interior lines.<sup>46</sup>

### **Industrial Ways**

Grant used rudimentary operational art in prosecuting the Vicksburg campaign. But it was not limited to the land dimension. Initially, it was not a coordinated scheme of maneuver but after Sherman's defeat at Chickasaw Bayou, Grant conducted a series of expeditions. In February and March 1863, four unsuccessful attempts were made to reach the goal by narrow outflanking maneuver.<sup>47</sup> These expeditions afforded him the opportunity to gain experience as he fought to maneuver in and around Vicksburg along on the west bank of the Mississippi river.

Grant saw the ultimate failure of southern raids in the west in that they were not linked to any other operation. Without linking the raid with more conventional operations the raid may achieve some destruction but did not achieve any lasting effect. Grant did link his raids against logistical sources in conjunction with conventional attacks to put pressure on southern forces at different locations to achieve the effect of total war and create command paralysis in the south.

One of the key components of the Vicksburg campaign was the coordinated effort on both land and sea. Admiral Porter's role in the success of the campaign cannot be underestimated. Under Porter's control, part of the union fleet and transport ran southward past the Vicksburg batteries, by night, to a point thirty miles below the fortress.<sup>48</sup> This sea borne maneuver combined with Sherman's distracting movements toward the northeast of Vicksburg caused the confederates to miscalculate the true nature of Grant's operation. Once the confederates realized Grant's true intent, it was too late to react with sufficient force.

### **Industrial Means**

The means by which the goals and objectives of the Union army realized was through the imposition of will on the confederate army, government, and people in order to restore the US republic. The issues of states rights and slavery were the significant issues, which fueled the internal debate. The northern aim was to initially strangle the south economically and then cause them to capitulate and return to the republic. This plan did eventually work but because of the south's initial tactical success, the north had to change its policy and push forward with raiding southern territory and taking the fight to the southern population.

The imposition of will was executed through military action in the form of distributed maneuver and sustained logistical support. In the western theatre, Grant decided to conduct

coordinated distributed maneuver in and around Vicksburg on land and sea while confederate leaders passively waited to defend Vicksburg. The practice of distributed maneuver requires sustained logistics. Grant under girded his Vicksburg campaign with careful logistical preparation.<sup>49</sup>

## **Analysis**

In the Vicksburg campaign, Lieutenant General Grant begins the early practical application of operational art. Technological innovations and the dimensions of time and space pushed Grant toward fighting to maneuver. The railroads, telegraphs, and steamships allowed commanders greater operational flexibility over time and space. It also caused significant logistical and sustainment requirements because units on land and sea were moving over greater distances in multiple theatres. The change in battlefield geometry also caused decisive battle to be less decisive.

No longer could commanders plan and prepare to fight a decisive battle and caused the culmination the entire enemy force. With multiple theatres and greater distances, operational level commanders were forced to plan, coordinate, and execute operations over longer distances and time with the appropriate logistical sustenance.

Grant practiced the indirect approach to accomplishing his operational mission in the Vicksburg campaign. Sherman's failure at Chickasaw Bayou forced Grant to develop a scheme of maneuver, which indirectly and systematically caused the confederate forces at Vicksburg to culminate. It also forced Grant to develop a close working relationship with his Naval Commander Admiral Porter. This professional relationship enhanced Grant's operational capability.

The mutual respect and professional understanding Grant shared with Admiral Porter facilitated Grant's ability to operate with the Naval assets in a new manner. By running the batteries at Vicksburg, Admiral Porter showed a willingness to risk his Naval assets in support of the operational objective. The Naval support enabled Grant to take a calculated risk of cutting himself loose from his new temporary base and move northeast into enemy territory without a solid line of communication.<sup>50</sup>

In summary, the changes in ends, ways, and means from Napoleon's agrarian age to Grant's industrial age primarily focused on the speed by which forces acted through time and space. Just as mass production was the core principle of industrial economies, mass destruction became the core principle of industrial age of warfare. It also changed the nature of the purpose and aim of commanders.



## Chapter 3

### Research Criteria

The purpose of this chapter is to specifically define and explain the criteria used based on the lessons learned from the historical analysis. In the historical analysis, Napoleon's operation in Jena-Auerstadt campaign served as the military example of examining agrarian ends, ways and means. Grant during the Vicksburg campaign served as the military example of examining industrial ends, ways and means.

The first research criteria used to assess the effectiveness of network centric warfare in the land dimension of warfare will be operational effectiveness. The second research criteria used to assess the effectiveness of network centric warfare in the land dimension of warfare will be strategic flexibility. The final criteria used to assess the effectiveness of network centric warfare in the land dimension of warfare will be perception management.

Operational Effectiveness is defined, as the ability to consistently provide the military capability of systematically imposing the national will of the US in support of strategic objectives. Network centric warfare enabled by information superiority appears to provide and effective means of enhancing US military capability and respond swiftly in support of national security interests. The application of this concept in the land dimension is epitomized by the digitization effort at Ft Hood with the 4<sup>th</sup> Infantry Division. The various digitized systems used are designed to be interoperable and provide distributed awareness and distributed understanding to all echelons of command. This distributed awareness and understanding will enable maneuver forces to gain and maintain an informational advantage over opposing forces. This informational advantage is exploited by attacking the adversary's key nodes rendering cybernetic shock.

Strategic Flexibility is defined as the ability to respond in time and space with the appropriate level of military force to defeat an adversary in support of national aims/interests. Most future US military action will be conducted on foreign soil. Knowing this fact, strategic responsiveness and the ability to quickly get US forces into a theatre via air, sea, or land is imperative. Technology has allowed lighter forces to increase their lethality as well as taking advantage of the information reach back capability. The current technology available provides a collaborative information structure to facilitate a common understanding of the environment, the adversary, and friendly forces. Network centric warfare enables US forces to maximize available technological capability and exploit the informational advantage.

Perception Management is defined as the ability to maintain political and popular support in advocating the use and application of military force. This area is of current concern. The issue of perception management is both internal and external. The internal issue of perception management deals with the national support and willingness to apply military force in support of national security objectives. The external issue of perception management is the willingness of coalition partners and United Nations to support the legitimacy of US military action in support of national security objectives.

In summary, operational effectiveness, strategic flexibility, and perception management will be used to measure the effectiveness of network centric warfare in the land dimension of warfare. Distributed maneuver was the means by which operational art was applied. The criteria will then be used to measure the application of network centric warfare in the information age and recommend whether NCW is better than distributed maneuver in the land dimension of warfare.

## **Chapter 4**

### **Network Centric Warfare**

#### **Strategic Context**

The proliferation of significant players and the global nature of markets and economies are increasing the complexity of doing business, whether that business is in the public or private sectors. Complexity is increasing in large part due to the impact that the Information Age is having on dimensions of time and space.<sup>51</sup> Complexity is a term used to describe the functioning of systems made up of "a great many agents interacting with each other in a great many ways."<sup>52</sup> Technologically based third wave societies are increasingly complex.

The world's most technologically advanced societies today have split level economies- partly using both Second Wave mass production, while partially integrating Third wave technologies and services.<sup>53</sup> The commercial companies in the private sector of these advanced societies have leveraged the emerging technologies of the information age in order to gain a competitive advantage over rival competitors. This competitive advantage obtained from the knowledge gained through information technology is the essence of what Network Centric Warfare provides the warfighter in the land dimension of warfare. But information technology managers in all three services say the only way network centric warfare can make the leap from concept to reality is by developing cohesive base-level and shipboard networks based on commercial standards at hundreds of locations throughout the world.<sup>54</sup>

Knowing more information faster is not enough. The proliferation of information has caused information overload and often times has turned into irrelevant digitized noise. Raw data once processed becomes information. Information once processed becomes knowledge. Once knowledge is applied, it facilitates wisdom. The ability to know more and leverage the

knowledge into applied wisdom faster while denying the competition the ability to do the same is the true military utility of the information age and network centric warfare. As Sun Tsu said, "Know the enemy and know yourself; in a hundred battles you will never be in peril."<sup>55</sup>

The utility of network centric warfare should not only be measured in terms of its effectiveness as optimizing combat and in confronting a symmetric third wave adversary. Necessity dictates that NCW be just as operationally effective against first and second wave adversaries operating in the land dimension. This task will encompass confronting terrorism, transnational criminal organizations, as well as disgruntled tribal or clan elements in a Stability and Support Operational environment.

Over time, the land dimension of warfare has evolved from the effectiveness of decisive battle in the agrarian age to the effectiveness of distributed maneuver in the industrial age. In the information age, distributed maneuver appears to be replaced by distributed knowledge, distributed understanding, self-synchronization, and focused combat power through time and space in the land dimension. This distributed knowledge and awareness is the key component of the digitization efforts of the 4<sup>th</sup> Infantry Division at Ft. Hood, Texas.

The digitization efforts ongoing at Ft. Hood have attempted to harness current technology in effort to gain an information advantage over a symmetric adversary in the land dimension. These efforts enabled by technology demonstrate the need for information system connectivity and interoperability. This system connectivity provides the means for developing a common operating picture among all battlefield units. A common operating picture is defined as an operational picture tailored to the user's requirements, based on common data and information shared by more than one command.<sup>56</sup>

Increasingly the world is becoming enshrouded, by webs of economic, social, political, environmental, military, ecological information that inextricably relate.<sup>57</sup> According to David Alberts, John Grastka, and Fred Stein there are many reasons why the post cold war environment has affected modern day military organization. These three are most notable:

The first is the increasing importance of operations other than war (OOTW) in which military organizations are being tasked to do a wide variety of non-traditional missions, from humanitarian relief to peace enforcement. Second, while these differences stem from geopolitical considerations, other changes in the mission space are driven by technology. Third is the emergence of the possibility of an entirely new form of warfare, Information Warfare, or perhaps more generically, Infrastructure Warfare. Finally, asymmetrical forms of warfare have become significantly more potent with the increased lethality and accessibility of weapons of mass destruction.<sup>58</sup>

The most important aspect of the information age is the ability for low budget third world threats or individual transnational adversaries to have the ability to purchase the technological means to wage asymmetric war. To counter this new post cold war threat environment potential, future military forces enabled with information superiority will allow maneuver forces to be lighter and more lethal. Achieving information superiority increases the speed of command preempting adversary options, and improves the effectiveness of selected options.<sup>59</sup> In the 1996 issue of the Strategic Forum Admiral Owens postulated, "We will never have perfect understanding of a battlefield, our systems and weapons will never work flawlessly all the time, and the forces we ask to wage war will never do everything correctly everytime."<sup>60</sup>

### **Concept**

Network Centric Warfare and all of its associated revolutions in military affairs grow out of and draw their power from the fundamental changes in American society.<sup>61</sup> The change in society and its approach to information technology has been central to the networked

approach to business. Network Centric Warfare is about human and organizational behavior.<sup>62</sup> Humans and organizations have to adjust their behavior to operate in a networked environment. The figure below shows the conceptual model for network centric warfare.

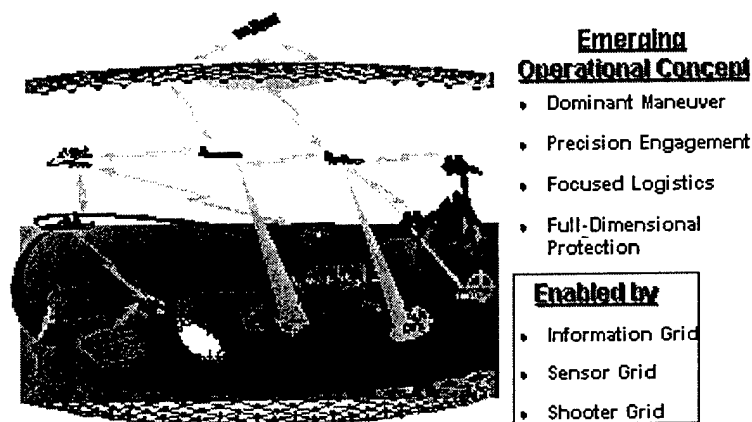


Figure 1: Network Centric Warfare Model<sup>63</sup>

The navy currently has the advantage with regard to embracing the concept and turning it into practical utilization. Another example of an existing operational architecture that employs network centric operations to increase combat power is the U.S. Navy Cooperative Engagement Capability (CEC).<sup>64</sup> The operational architecture of CEC increases combat by networking the sensors, command and control, and shooters of the Carrier Battle group platforms to develop a sensor grid and shooter grid.<sup>65</sup> The mission-specific sensor grid embedded in CEC generates a high level of battlespace awareness.<sup>66</sup> The sensor grid accomplishes this by fusing from multiple sensors, enabling quantum improvements in track accuracy, continuity, and target identification over stand-alone sensors.<sup>67</sup> The CEC shooter grid exploits high levels of awareness to generate increased combat power by extending the

battlespace and engaging incoming targets in depth with multiple shooters with increased probability of kill.<sup>68</sup>

The Army/Air Force Suppression of Enemy Air Defense (SEAD) operations have significantly increased the survivability of air assets for military units conducting cross forward line of troop operations. The networked approach to the suppression of enemy air defense is an example of taking a concept and making it an operationally effective application in the land and space dimension of warfare.

Strategic intelligence units have been operating in a classified 'networked' environment for a number of years. Network computing allowed national level consumers the ability to know critical classified information in support of national level decision makers. The proliferation of open source information has created an environment by which these classified legacy systems are not equipped to keep up with the current pace of commercial off the shelf technology. This doctrine is being developed in order to accelerate the pace of movement of forces, maintain an unrelenting operational tempo, and decisively engage the enemy at the time and place of our choosing.<sup>69</sup>

### **Information Grid**

The information grid provides the infrastructure for Network Centric computing and communications. This is the physical information architecture by which information is shared both vertically and horizontally. This grid provides the necessary infrastructure to permit the plug and play of the sensors and shooters.<sup>70</sup> The connectivity and computing capabilities of the information grid enable the sensor grid to generate battlespace awareness, a key building block of Information Superiority.<sup>71</sup> Information Superiority enables forces to leverage the advantage of knowing better information faster. It conceivably enables forces to operate

simultaneously in a non-contiguous environment. The information grid, portrayed in Figure 2, is a network of networks consisting of communication paths, computational nodes, operating systems, and information management applications that enable network centric computing and communications across the Joint battlespace.<sup>72</sup>

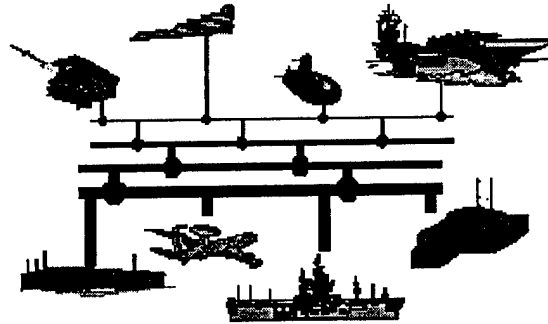


Figure 2: The Information Grid<sup>73</sup>

The application of the information grid in the land dimension is the ability to network systems through wireless means allowing units operating in a non-linear non-contiguous environment to maintain situational awareness and situational understanding. Existing Army systems such as All Source Analysis System (ASAS) provides classified systems for intelligence connectivity with various strategic systems vertically and some maneuver systems horizontally. The primary concern lies with the development of human intelligence. In Stability and Support Operations (SASO) and Military Operations Other Than War (MOOTW) environments, human intelligence will be the predominant means for developing the information foundation in an immature theatre and this requirement is already recognized. The information grid must allow human intelligence assets to feed into the information grid.

### **Sensor Grid**

The sensor grid provides the Joint Force Commander with the operational capabilities necessary for achieving awareness across the Joint battlespace. Sensors provide the constant reconnaissance and surveillance needed to confirm enemy strengths and weaknesses. In FM



3-0, Operations (DRAG) the plethora of sensors help the commander to visualize the environment, describe the effects (friendly and enemy), and direct combat forces to accomplish the military aim/goal. The one sensor not listed in the model, which is the most important, is the human sensor. The sensor peripherals consist of space, air, ground, sea, and cyberspace-based sensors as listed below:

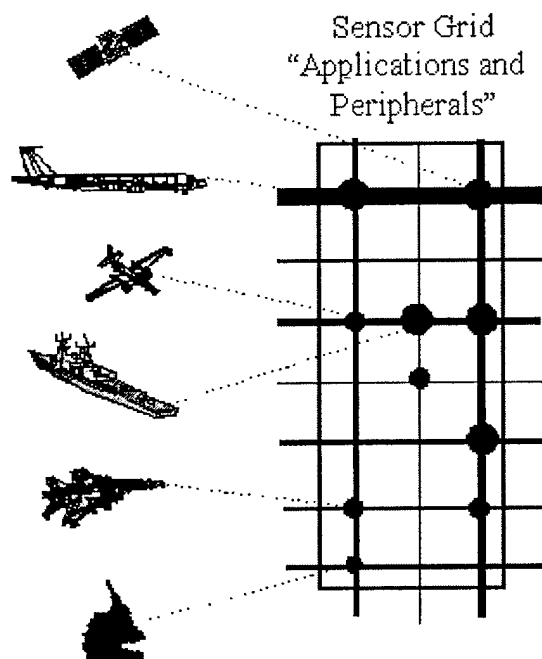


Figure 3: The Sensor Grid<sup>74</sup>

A key element of the sensor grid in the land dimension is the integration of the human sensor. In future conflicts, ground and intelligence soldiers will provide critical information to the sensor grid because first and second wave adversaries will negate US technological capabilities by low-tech means. In an immature theatre, human intelligence is the primary way of visualizing and describing the environment. Once a theatre is mature, technology will enable forces to maintain situational awareness and understanding.

## Shooter Grid

The operational architecture of the shooter grid enables the Joint Warfighter to plan and execute operations in a manner that achieves an overwhelming effect at precise places and time.<sup>75</sup> These new operational capabilities for force employment enable the emerging operational concepts of precision engagement, dominant maneuver, focused logistics, and full-dimension protection. All of these concepts are enabled by way of leveraging the competitive advantage gained through information superiority.

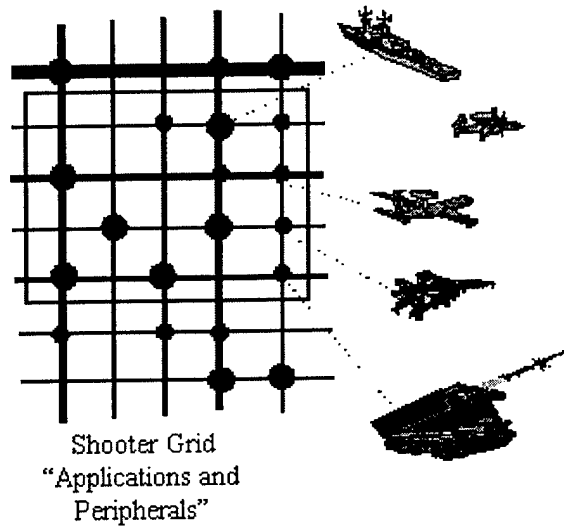


Figure 4: The Shooter Grid<sup>76</sup>

The application of the shooter grid in the land dimension lies within the connectivity with the soldier on the ground. Infantry systems such as Land Warrior must be integrated and connected with Joint assets to allow soldiers on the ground the maximum battlespace awareness possible. This shooter linkage also applies to information sent to tactical operations centers and indirect fire elements.

## Analysis

Based on the research findings, the implications for the modification of information age ends, ways, and means in the land dimension by way of Network Centric Warfare are significant. NCW offers operational effectiveness through the ability to enable forces to operate with distributed awareness and distributed understanding. This distributed awareness and understanding leads to better decision making at a faster rate than the enemy. It also offers forces the ability to consistently provide the military capability of systematically imposing the national will of the US in support of strategic objectives in a constrained environment.

In the agrarian age, Napoleon's attention to detail and veracity for winning enabled him to develop strategies, which gave him a competitive advantage over his adversaries. Knowledge of the environment, his forces, and the enemy's capabilities enabled him to position himself for military success. Jena Auerstadt serves as a great example of moving to fight and the classical warfare's decisive battle.

Napoleon's overriding advantage was the experience of his leaders and the institutionalized learning of the military organization. Once these elements were gone Napoleon was not able to accomplish his military objectives as evidenced in the battle of Leipzig and later in the battle of Waterloo. His enemy's began to understand his strategy and waged war where he was not physically able to influence the outcome of the fight. Imitation is the highest form of flattery.

In the Industrial age, Lieutenant General Grant paid close attention to logistical support for his army. After his most notable corps commander, Sherman, was repulsed at Chickasaw Bayou, he decided to fight to maneuver. He began a series of expeditions, which appears to

be insignificant. These expeditions were in fact instrumental in facilitating the development of distributed maneuver. Grant continued fight and maneuver south of Vicksburg with the help of Admiral Porter's littoral operations along the Mississippi river. Grant's operational patience and persistence allowed him to out think his opponent as well as out maneuver them.

In the information age, NCW offers strategic flexibility by way of developing multiple kinetic and non-kinetic options to facilitate the operational commanders thinking and decision making process. The non-kinetic means of surveillance allows near real time situational updates and enroute mission planning. The kinetic option offers the ability to conduct precise engagements minimize collateral damage. Theoretically, it also provides the ability to respond in time and space with the appropriate level of military force to defeat an adversary in support of national security objectives. The consideration for collateral damage is a constant concern based on the proliferation of the media. The need for media support is more prevalent today than ever before.

NCW addresses perception management by providing clarity and unity of effort to maneuver units at the lowest level. This increased operational knowledge base facilitates a common operational picture. The issue of perception management deals with the national support and willingness to apply military force in support of national security objectives. The external issue of perception management is the willingness of coalition partners and United Nations to support the legitimacy of US military action in support of national security objectives. This legitimacy is important because it will directly relate to the will of the US public to support the commitment of military force in the land dimension.

## Chapter 5

### Recommendations / Findings

Network Centric Warfare is a concept about means.<sup>77</sup> It appears to be the conceptual means of waging war in the information age. The network-computing concept allows military forces to have light mobile systems which enable distributed knowledge in a non-linear non-contiguous environment. Distributed awareness and distributed understanding through information superiority allows future military forces operating in the land dimension to selectively engage targets in restrictive and constrained environment. This environment has changed because of the post cold war strategic environment. The proliferation of the media and open source information allows closer scrutiny of the application of military force. Conceptually, NCW appears to be a better way to apply military force in the information age.

In the agrarian age, Napoleon's means of waging total war was by way of decisive battle. His organizational changes and the development of the corps were instrumental in his tactical success. The development of general staff officers, exemplified by Berthier, also contributed to his tactical success. His "directed telescope" enabled him to know ground truth concerning his soldiers and equipment. Moving to fight faster than the enemy enabled by logistical planning facilitated tactical victory.

In the industrial age, Lieutenant General Grant's means of applying military force in a total war situation in the land dimension, as demonstrated at Vicksburg, was distributed maneuver. It is arguable whether Grant deliberately knew he was conducting the early stages of the best form of warfare in the industrial age. Enabled by the technological advancements of the telegraph, railroad, and steamship, Grant fought to move in and around Vicksburg along

exterior lines. His tenacity and operational patience allowed him to leverage a tactical advantage over Pemberton's confederate forces and split the confederacy in two.

In the information age, NCW appears to be a better method of applying military force in the land dimension of the constrained post cold war environment. NCW allows strategic flexibility, operational effectiveness, and a means to address the issue of perception management. However, if a total war situation evolves, distributed maneuver enabled by information superiority is the more effective means of engaging the enemy in a non linear noncontiguous environment.

In closing, information superiority enables commercial companies to leverage a competitive advantage over other companies based on increased efficiency. In the land dimension of warfare, NCW enabled by information superiority must demonstrate effectiveness over efficiency. Effectiveness, in the land dimension of warfare, means offering the operational commanders various kinetic and non-kinetic options to facilitate his visualization, description, and direction for the application of military force. The human element of warfare in the land dimension can never be marginalized. NCW's ability to integrate the human interaction needed to solidify the connectivity of systems needs to be discussed and examined as much as system connectivity and interoperability.

## ENDNOTES

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